

## USGS NSF GRIP Opportunity

● <b>USGS Center:</b>	National Research Program - Eastern Branch
● <b>Project Title:</b>	Geomorphic influence on resilience of tidal freshwater wetland resilience to sea level rise and salinization
● <b>Project Hypothesis or Objectives:</b>	<p>Sea level rise is occurring and is almost certain to accelerate in the near future due to global warming. Current knowledge of the responses of tidal wetland ecosystems to sea level rise is not sufficient to predict their dynamics and enable effective and efficient resource management. Changes in water depth and salinity due to sea level rise are likely to change the resilience of these ecosystems as well as their carbon, nutrient, and sediment trapping functions. However, little is known about the sensitivity of tidal freshwater wetlands, especially forested wetlands (TFFW), to sea level rise. TFFW occur at the interface of nontidal watershed and estuarine tidal, salt-impacted wetlands – they are the most upstream estuarine wetlands. Next to nothing is known about ecogeomorphic changes at the interface of tide and watershed in TFFW. Furthering understanding of material transport at the edge of tidal influence has important consequences for predicting future impacts of rising sea level as well as estuarine eutrophication. We predict that high rates of allochthonous riverine deposition on upper TFFW, coupled with more frequent inundation and the resulting greater prevalence of soil anoxia resulting in lower soil greenhouse gas emissions, should lead to enhanced soil C (and sediment, N, and P) accumulation at locations switching from nontidal to tidal.</p> <p>The proposed intern research opportunity would focus on measurement of sediment and associated C inputs, greenhouse gas emissions, and long-term soil C accumulation at the nontidal/tidal transition of tidal rivers. Our existing TFFW project has newly established sites on the adjacent Mattaponi and Pamunkey rivers (Chesapeake Bay watershed, Virginia), which are nearly identical except for a 7x greater watershed sediment load in the nontidal Pamunkey River. Along each river, five sites were established from non-tidally inundated floodplain, upper reach TFFW, lower reach TFFW, salt stressed and transitioning TFFW, to oligohaline marsh. The intern research would complement the existing long-term research designed to identify ecosystem changes in response to</p>

sea level rise. We seek collaboration in the measurement of C and/or N and P inputs, cycling, and loss. For example, one research topic could be measurement of long-term soil C (and N and P) accumulation using <sup>210</sup>Pb and <sup>137</sup>Cs dating of sediment cores. Alternatively, the research could focus on changes in biogeochemical processes in response to sea level rise. The intern would also integrate their findings with the modeling and synthesis efforts of the USGS Blue Carbon Working Group.

● <b>Duration:</b>	6 to 12 months
● <b>Internship Location:</b>	Reston, VA
● <b>Area of Discipline:</b>	Ecosystem ecology Biogeochemistry Geomorphology Wetlands
● <b>Expected Outcome:</b>	The intern will learn new research methods for understanding the hydrogeomorphic and biogeochemical controls on wetland soil processes, contribute to the emerging field of tidal freshwater response to climate change, and build a network of collaborators, colleagues, and contacts within the federal scientific community. The USGS will learn new laboratory and field methods for measuring biogeochemical responses to sea level rise, collaborate on new research studies to further understanding of ecosystem responses to climate change, and advance the goals of the Water, Ecosystems, and Climate and Land Use Change Mission Areas.
● <b>Special skills/training Required:</b>	Training and experience in collecting soil or sediment cores, measuring biogeochemical processes (C, N, or P), working in wetlands, and understanding of hydrogeomorphology
● <b>Duties/Responsibilities:</b>	The intern would collaborate as a member of our research team, leading a research component of their choosing that would advance our project and USGS goals. The intern will plan research, conduct field work and laboratory analyses, analyze and interpret data, and work towards publishing a manuscript. The intern would also participate in other research projects of our research team on the topic of ecogemorphic controls on the sources, transport, and fate of nutrients in wetland ecosystems.
● <b>Point of Contact or Mentor:</b>	Greg Noe
● <b>Point of Contact e-mail:</b>	gnoe@usgs.gov